Roll-2-Roll Technologies

Surface Defect Detection

Documentation

Surface defect detection identifies holes, tears, voids, contamination, and other quality issues on moving webs in real time. Roll-2-Roll Technologies provides high-resolution sensors that detect defects as small as 1mm at line speeds up to 500 m/min—preventing defective material from reaching customers and enabling immediate process corrections. Unlike manual inspection or end-of-line quality checks, our sensors provide 100% inspection coverage, catching defects the moment they occur.

The Challenge: Defects Discovered Too Late

Traditional quality control methods create costly delays and customer rejections:

- **End-of-Line Inspection:** Manual inspection after winding means defective material has already been produced—requiring expensive rework or scrap.
- **Sample-Based QC:** Inspecting only samples (e.g., every 10th roll) allows defective rolls to ship undetected.
- **Operator Fatigue:** Human inspectors miss defects during long shifts, especially on high-speed lines or repetitive patterns.
- **No Process Feedback:** Without real-time defect detection, operators cannot correlate defects with process parameters to identify root causes.

The Solution: Automated 100% Web Inspection

Roll-2-Roll defect detection sensors scan the full width of the web continuously, identifying defects in real time and triggering automatic responses.

How It Works

1. **Full-Width Scanning:** Line scan sensors with viewing areas up to 960mm inspect 100% of the web surface
2. **Defect Classification:** Advanced algorithms distinguish between holes, tears, contamination, and coating voids
3. **Size & Location Mapping:** Each defect is measured and its location logged with timestamp and web position

4. **Automatic Actions:** When defects are detected, the system can trigger alarms, reject mechanisms, or stop the line

Key Advantage: Real-time detection enables immediate process corrections—preventing continuous production of defective material that traditional end-of-line inspection cannot stop.

Key Benefits

- **100% Inspection Coverage:** Every centimeter of web is inspected—no sampling, no gaps
- **Real-Time Process Feedback:** Defects detected instantly, allowing operators to correct process parameters immediately
- **Prevent Customer Rejections:** Defective material is identified and removed before shipping
- **Data-Driven Quality Improvement:** Defect logs enable root cause analysis and continuous improvement
- **Eliminate Operator Fatigue:** Automated inspection provides consistent quality monitoring regardless of shift length

Applications by Industry

- **Battery Manufacturing** — Detect holes, tears, and coating voids in electrode films that create cell safety hazards.
- **Nonwovens & Hygiene** — Identify tears and holes in diaper topsheets and backsheets before assembly.
- **Flexible Packaging** — Detect pinholes and contamination in barrier films that compromise package integrity.
- **Medical Device Manufacturing** — Ensure defect-free materials enter sterile packaging lines (FDA compliance).
- **Film Extrusion** — Detect gels, contamination, and thickness variations in real time during production.

Related Solutions

- Splice Detection — Detect splices and joints
- Flag Detection — Identify defect flags and markers
- Edge Detection — Monitor web position